

COPELAND ISLAND LIGHT.

RETURN to an Order of the Honourable The House of Commons,
dated 9 August 1880;—for,

COPY "of CORRESPONDENCE between the Commissioners of Irish Lights,
the Trinity House, and the Board of Trade, respecting the Improvement
of the LIGHT on, and the Establishment of a FOG SIGNAL at, *Copeland
Island*, and the Adoption of Gas instead of OIL as a Means of Illuminating
that Station."

Board of Trade, }
9 August 1880. }

T. H. FARRER.

(*Mr. Ewart*)

Ordered, by The House of Commons, to be Printed,
10 August 1880.

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COPY of CORRESPONDENCE between the Commissioners of Irish Lights, the Trinity House, and the Board of Trade, respecting the Improvement of the LIGHT on, and the Establishment of a FOG SIGNAL at, *Copeland Island*, and the Adoption of GAS instead of OIL as a Means of Illuminating that Station.

— No. 1. —

Trinity House to Board of Trade.

(H. 2197.)

Sir, Trinity House, London, E.C., 12 March 1879.

REFERRING to previous correspondence, and particularly to the letters from this House, dated 26th September and 30th October last, relative to *Copeland Island Light*, I am now directed to transmit, for the information of the Board of Trade, copy of further correspondence which has passed between the Commissioners of Irish Lights and this Corporation thereupon.

The Assistant Secretary,
Harbour Department, Board of Trade.

I am, &c.
(signed) *Robin Allen.*

Enclosure 1, in No. 1.

Sir, Irish Lights Office, Dublin, 22 February 1879.

I AM directed by the Commissioners of Irish Lights to request you will be good enough to call the attention of the Elder Brethren to the letter from this department of the 28th October last, having reference to the proposal that the *Copeland Island Lighthouse* establishment should be removed to *Mew Island*, and in asking for a reply thereto, am to request you will kindly inform me whether the Elder Brethren continue to be of the opinion that *Copeland Island* with a first order dioptric light and powerful fog signal will, under the circumstances, be the most suitable arrangement.

The Secretary, Trinity House, London.

I am, &c.
(signed) *W. Lees, Secretary.*

Enclosure 2, in No. 1.

Sir, Trinity House, London, E.C., 12 March 1879.

I AM directed to acknowledge the receipt of your letter, dated 22nd ultimo, adverting to that of 28th October last, further as to the best arrangement for *Copeland Island*, and in reply thereto, I am to acquaint you that the Elder Brethren continue to be of opinion that *Copeland Island*, with a first order dioptric light and powerful fog signal will, under the circumstances, be the most suitable, and I am hereby to notify to you the Corporation's approval of the same under the statute.

The Secretary, Irish Lights Office, Dublin.

I am, &c.
(signed) *Robin Allen.*

— No. 2. —

Trinity House to Board of Trade.

(H. 3788.)

Sir, Trinity House, London, E.C., 16 May 1879.

REFERRING to previous correspondence, and particularly to the letter from this House, dated 12th March last, on the subject of *Copeland Island*, I am now directed to transmit, for the information of the Board of Trade, the accompanying

ing further correspondence which has passed between the Commissioners of Irish Lights and this Corporation respecting the character of the fog signal which it is proposed to establish at that station; from which it will be seen that, subject to future determination as to its distinctive character, the Elder Brethren have accorded their statutory sanction to the placing of a siren fog signal of the first class thereto.

The Assistant Secretary,
Harbour Department, Board of Trade.

I am, &c.
(signed) *Robin Allen.*

Enclosure 1, in No. 2.

Sir,
Irish Lights Office, Dublin, 31 March 1879.
REFERRING to your letter of the 12th instant, conveying the statutory sanction of the Elder Brethren to changing the light on Copeland Island from a catoptical to a first dioptric, also the establishment of a powerful fog signal thereto, I am directed by the Commissioners of Irish Lights to acquaint you that they have had their attention drawn to the satisfactory results gained from the gun-cotton rocket recently established as a fog signal at Tuskar, the reports being heard, on a favourable occasion, at the Lucifer Shoals Light Vessel, distant nine miles, the wind at the time being light and from the southward. It has, therefore, suggested itself to the Commissioners that Copeland Island would be a suitable place to further develop the rocket system of fog signalling on the Irish Coast, and should the Elder Brethren concur in this opinion, and accord their statutory sanction thereto, the heavy expenditure attendant on the establishment of a first class fog siren would be obviated.

The Secretary to the Trinity House,
London.

I am, &c.
(signed) *W. Lees, Secretary.*

Enclosure 2, in No. 2.

Sir,
Trinity House, London, E.C., 4 April 1879.
I AM directed to acknowledge the receipt of your letter, dated 31st ultimo, adverting to the intended fog signal at Copeland Island, and proposing to apply the rocket system thereto, and in reply I am to submit the following observations:—

At rock stations, where the alternative was a small bell, the rocket has been an incontestable improvement, and at shore establishments, where, as at Flamborough, a gun every quarter of an hour had previously been the signal, the more frequent repetition (once in 10 minutes), and the projection of the explosive clear of any possible sound shadow, were results which justified its adoption; but if the rocket is to be measured against a first class siren, it seems to the Elder Brethren that its selection must be affected by conditions of a special character. On the one hand, a first class siren is capable of giving a blast of five seconds every two minutes as against the merely momentary sound of an explosive, which cannot be so frequently repeated, except by almost incessant labour and greatly increased expense.

On the other hand, the conditions favourable for the rocket would appear to be—

- (1.) The clear absence of necessity for any very frequent recurrence of the signal.
- (2.) The rapid development of fog (when the prompter application of the explosive signal would be an advantage).
- (3.) Obstructions likely to cause (as respects the siren) a sound shadow.

To what extent these conditions exist at Copeland the Irish Lights Commissioners and their advisers will be the best of judges; in the meantime, and as respects the merely economical side of the question, the Elder Brethren direct me to enclose comparative estimates, as prepared by the Corporation's engineer; No. 1 giving the cost of a siren, and No. 2, of the rocket signal; the latter estimate being expanded into the relative outlay, whether the rocket be used every ten, every five, or every two minutes during fog.

The Secretary,
Irish Lights Commissioners, Dublin.

I am, &c.
(signed) *Robin Allen.*

STATEMENT No. 1.

First Class Siren Fog Signal (Shore Station).

(A blast of five seconds every two minutes.)

First Cost:										£.	s.	d.
Fog signal-house and dwelling	-	-	-	-	-	-	-	-	-	1,800	-	-
Machinery and plant	-	-	-	-	-	-	-	-	-	2,050	-	-
										£.	3,850	-
Annual Cost (360 hours of fog):										£.	s.	d.
Interest on first cost, at $3\frac{1}{2}$ per cent.	-	-	-	-	-	-	-	-	-	134	15	-
Repairs and renewals	-	-	-	-	-	-	-	-	-	109	-	-
Coke (19 tons) and other stores, &c.	-	-	-	-	-	-	-	-	-	20	8	10
Wages, &c., one keeper	-	-	-	-	-	-	-	-	-	69	17	6
										£.	334	1 4

STATEMENT No. 2.

Gun Cotton or Cotton Powder Rocket Signals (Shore Station).

First Cost:										£.	s.	d.
Magazine	-	-	-	-	-	-	-	-	-	50	-	-
Dwelling for attendant	-	-	-	-	-	-	-	-	-	800	-	-
Rockets, stands, lanterns, &c.	-	-	-	-	-	-	-	-	-	5	-	-
										£.	655	-
Annual Cost (360 hours of fog): (A rocket every ten minutes.)										£.	s.	d.
Interest on first cost, at $3\frac{1}{2}$ per cent.	-	-	-	-	-	-	-	-	-	22	18	6
Repairs and renewals	-	-	-	-	-	-	-	-	-	9	15	-
Other stores	-	-	-	-	-	-	-	-	-	8	-	-
Wages, &c., one keeper	-	-	-	-	-	-	-	-	-	69	17	6
										£.	108	11
2,160 rockets, at 1 s. 7½ d.	-	-	-	-	-	-	-	-	-	175	10	-
										£.	284	1
(Or rocket every five minutes.)										£.	s.	d.
Interest, wages, &c., as above	-	-	-	-	-	-	-	-	-	108	11	-
4,320 rockets, at 1 s. 7½ d.	-	-	-	-	-	-	-	-	-	351	-	-
										£.	459	11
(Or rocket every two minutes.)										£.	s.	d.
Interest, wages, &c., as above	-	-	-	-	-	-	-	-	-	108	11	-
10,800 rockets, at 1 s. 7½ d.	-	-	-	-	-	-	-	-	-	877	10	-
										£.	985	1

Enclosure 3, in No. 2.

Sir,

Irish Lights Office, Dublin, 12 May 1879.

I am directed by the Commissioners of Irish Lights to acknowledge the receipt of your letter of the 4th ultimo, in reply to their letter of the 31st March last, requesting the statutory sanction of the Elder Brethren to the establishment of the gun-cotton rocket as a fog signal at Copeland Island; and am now to state that the Commissioners having given careful consideration to your letter and to the statement which accompanied it, they are now prepared, on a reconsideration of the entire subject, to request the statutory sanction of the Elder Brethren to the establishment of a first class siren at Copeland Island, the more particularly so as they are advised that the sound should be one of frequent recurrence at this station.

The Secretary to the Trinity House,
London, E.C.

I am, &c.
(signed) W. Lees, Secretary.

Enclosure 4, in No. 2.

Sir,

Trinity House, London, E.C., 15 May 1879.

HAVING laid before the Board your letter, dated 12th instant, farther relative to the character of the fog signal to be established at Copeland Island, and stating that the Commissioners of Irish Lights, upon reconsideration of the entire subject, are now prepared to request the sanction of this Corporation to the establishment thereof of a siren of the first class, instead of the rocket signal as suggested in your letter of 31st March last; I am directed, in reply, to acquaint you that, subject to future determination as to its distinctive character, the Elder Brethren have much pleasure in hereby acceding their statutory sanction to the establishment of a siren fog signal at Copeland Island as now proposed.

The Secretary, Irish Lights Office,
Dublin.

I am, &c.
(signed) Robin Allen.

— No. 3. —

Board of Trade to Trinity House.

(H. 3788.)

Board of Trade (Harbour Department),
Whitehall Gardens, S.W.,
29 May 1879.

Sir,

REFERRING to recent correspondence respecting the proposed establishment of a first class siren fog signal at Copeland Island agreed upon between the Corporation of Trinity House and the Commissioners of Irish Lights, I am directed by the Board of Trade to signify their statutory sanction to the same.

The Board of Trade will be glad to be informed whether they are to understand from the letter of the Trinity House of the 12th March to the Commissioners of Irish Lights, that the Elder Brethren give their statutory sanction to the conversion of the light at Copeland Island from catoptric to dioptric first order.

The Secretary to the Trinity House.

I am, &c.
(signed) C. Cecil Trevor.

— No. 4. —

Board of Trade to Commissioners of Irish Lights.

(H. 3788.)

Board of Trade (Harbour Department),
Whitehall Gardens, S.W.,
29 May 1879.

Sir,

REFERRING to recent correspondence between the Corporation of Trinity House and the Commissioners of Irish Lights, I am directed by the Board of Trade to state that they have this day signified to the Corporation their statutory sanction to the establishment of a first class siren fog signal at Copeland

Copeland Island, and will be glad to be favoured with estimates of cost for the whole alteration.

The Secretary to the
Commissioners of Irish Lights.

I am, &c.
(signed) C. Cecil Trevor.

— No. 5. —

Commissioners of Irish Lights to Board of Trade.
(H. 4952.)

Irish Lights Office, Dublin,
7 July 1879.

Sir,

ADVERTING to recent correspondence on subject of the improvement of the light on Copeland Island, and the establishment of a powerful fog signal at that station, but more particularly to your letter of the 29th May last, in which you request to be favoured with an estimate of cost for the whole alterations, I am now to forward herewith, by direction of the Commissioners of Irish Lights, detailed estimates of cost prepared by their engineer:—

1st. For altering the present catoptric light on Copeland Island to a first order dioptric light burning gas, and a powerful fog siren driven by a gas or calorific engine.

2ndly. For the same order light burning mineral oil, and similar fog signal to above.

In submitting these documents for consideration, I am to convey to you the recommendation of the Commissioners, that gas should be adopted as the illuminant at this station, a recommendation which they are strengthened in making by the very interesting report which Professor Tyndall has made to them, on result of recent gas experiments carried out under his direction at Galley Head, and by the manner which he therein advocates the extension of the gas system of lighthouse illumination, a copy of which report I have the honour to forward for the information of the Board of Trade, together with the observations of the Engineer and Inspector of Lights thereon.

I am, &c.
(signed) W. Lee, Secretary.

The Assistant Secretary,
Harbour Department, Board of Trade.

Enclosure 1, in No. 5.

COPELAND ISLAND LIGHTHOUSE.

ESTIMATED COST of altering present Light to a First Order fixed Dioptric. Cost of Works for burning Gas or Mineral Oil in a Six-wick Burner. To work with either System a powerful Fog Siren driven by a Gas Engine or a Calorific Engine.

	GAS.			MINERAL OIL.		
	Fog Siren worked by a Gas Engine.			Fog Siren worked by a Calorific Engine.		
Cost of works	£.	s.	d.	£.	s.	d.
	9,437	6	9	8,470	18	2
Annual maintenance	455	12	9	392	1	4
Ordinary repairs	140	9	8	135	4	4
Special repairs	125	8	11	119	15	4
Interest on estimated outlay, at 3½ per cent.	350	6	2	296	9	8
£.	1,007	15	6	914	7	8

16 December 1878.

(signed) W. Douglass.

Note.—Mineral oil being 2½ d. cheaper this year than last year, therefore present cost of maintenance for mineral oil would be at present price, £914 l. 0 s. 8 d.

27 June 1879.

(signed) W. Douglass.

Enclosure 2, in No. 5.

COPPLAND LIGHTHOUSE.

ESTIMATED COST of Altering present Light to Dioptric Light Burning Gas with powerful Fog Siren.

LANTERN AND BUILDINGS:	£.	s.	d.	£.	s.	d.
First Order Lantern	1,232	—	—			
Carriage, fixing, and taking down old lantern	225	—	—			
Alteration to gallery of tower	100	—	—			
Gas house	850	—	—			
Gunmakers' house	600	—	—			
Superintendence	125	—	—			
House for fog siren and engine	650	—	—	3,843	—	—
DIOPTRIC APPARATUS:						
Dioptric apparatus	1,621	—	—			
Additional prisms for red light	120	—	—			
Light for New Island	65	—	—			
Carriage and fixing	90	—	—			
Temporary light	850	—	—	2,326	—	—
GAS APPARATUS:						
Gas apparatus, retort benches, retorts, and pipes	850	—	—			
Meters, gas pipes to dwellings, meter-houses, &c.	150	—	—			
Carriage of material	75	—	—			
Superintendence	125	—	—	1,200	—	—
FOG SIREN:						
Fog siren	308	8	—			
Receivers	215	—	—			
Two engines, carriage, and erection	602	—	—			
Superintendence	55	—	—	1,200	8	—
10 per cent. Contingencies						
				8,579	8	—
				637	18	0
	£.			9,217	6	9

16 December 1878.

(signed) W. Douglas.

Enclosure 3, in No. 5.

COPELAND LIGHTHOUSE.

ESTIMATED COST of Altering Present Light to a First Order Dioptric Light,
Burning Mineral Oil, with powerful Fog Siren.

LANTERN AND BUILDINGS:		£.	s.	d.	£.	s.	d.
First-order lantern	-	-	-	-	1,288	-	-
Carriage fixing and taking down old lantern	-	-	-	-	225	-	-
Widening gallery	-	-	-	-	160	-	-
Ventilating oil store	-	-	-	-	95	-	-
Superintendence	-	-	-	-	125	-	-
House for fog siren	-	-	-	-	650	-	-
House for keeper	-	-	-	-	600	-	-
					5,013 - -		
DIOPTRIC APPARATUS:		£.	s.	d.			
Dioptric apparatus	-	-	-	-	1,021	-	-
Additional prisms for red light	-	-	-	-	120	-	-
Light for Mew Island	-	-	-	-	65	-	-
Sixteen mineral oil tanks	-	-	-	-	120	-	-
Two hundred and forty-four mineral oil drums	-	-	-	-	155	12	-
Temporary light	-	-	-	-	250	-	-
Superintendence	-	-	-	-	75	-	-
Carriage and fixing	-	-	-	-	90	-	-
					2,566 12 -		
FOG SIGNALS:		£.	s.	d.			
Two electric engines	-	-	-	-	1,500	-	-
Carriage and fixing	-	-	-	-	75	-	-
Fog siren	-	-	-	-	368	-	-
Two air-reservoirs	-	-	-	-	215	-	-
Superintendence	-	-	-	-	65	-	-
					2,063 - -		
					7,700 12 -		
Ten per cent. Contingencies					770 1 9		
					£. 8,470 13 9		

16 December 1878.

(signed) *W. Douglas.*

Enclosure 4, in No. 5.

Professor Tyndall's Report, and the observations of the Engineer and Inspector of Lights, are contained in Parliamentary Paper, No. 405, of Session 1879.

— No. 6. —

Board of Trade to Commissioners of Irish Lights.

(H. 4952.)

Board of Trade (Harbour Department),
Whitehall Gardens, S.W.,
14 August 1879.

Sir,

I AM directed by the Board of Trade to acknowledge the receipt of your letter of the 7th ultimo, enclosing estimates of the cost of carrying out the proposed alterations in the light establishment at Copeland Island, and stating that, having regard to the report of Professor Tyndall (copy of which also accompanied your letter) on the success of the gas-light at Galley Head, the Commissioners of Irish Lights would recommend the same illuminant for adoption at Copeland Island.

I am, in the first place, to state that, looking to the considerable excess both as regards first cost and maintenance in the estimate for a gas establishment over that for an oil light, the Board would be glad, before further considering the application, to be favoured by the Commissioners with fuller reasons for their preferring to employ gas at this station.

I am also to request fuller information as to the proposals of the Commissioners in respect of the "red light" and "light for Mew Island," referred to in the estimates.

The Secretary to the
Commissioners of Irish Lights.

I am, &c.
(signed) *Henry G. Calcraft.*

— No. 7. —

Commissioners of Irish Lights to Board of Trade.

(H. 6362.)

Irish Lights Office, Dublin,
15 September 1879.

Sir,

I AM directed by the Commissioners of Irish Lights to acknowledge the receipt of your letter of the 14th ultimo, requesting further information in connection with the recommendation contained in my letter of the 7th July last, that gas should be adopted as the illuminant at Copeland Island.

In reply, I am to acquaint you, that your letter having been referred to the committee of inspection, they have again given the entire of this subject full consideration, and I am now to forward, for the information of the Board of Trade, copy of their report, which has been adopted by the Commissioners, together with copy of a joint report by the Engineer and Inspector of Lights, alluded to therein, and to state that the engineer has been instructed to furnish amended estimates, which will be forwarded in due course.

With reference to the "red light" and the light to be shown over the Mew Island,

Island, the Commissioners would defer the further consideration of this subject for the present.

I am, &c.
(signed) *W. Lees*,
Secretary.

The Assistant Secretary,
Harbour Department, Board of Trade.

Enclosure 1, in No. 7.

THE inspecting committee have again considered the question of the lighting of Copeland Island and the Board of Trade's letter of 14th August. In their opinion this light is one of the most important in Ireland to the large amount of passing shipping; they therefore consider that it should be a first-class light, capable of being augmented during fogs to the highest pitch at present known.

They, therefore, notwithstanding the joint report of the inspector and engineer (which they recommend to be forwarded to Board of Trade), adhere to their recommendation, founded on the expressed opinion of Doctor Tyndall (in his Report on Gas), that gas should be the illuminant, it being the only one as yet proved by experience capable of being augmented to duplex or trifurc, as necessity may require. They shall send amended estimates as soon as prepared.

The question of red prisms withheld for the present.

12 September 1879.

Enclosure 2, in No. 7.

Sir,

Irish Lights Office, Dublin, 10 September 1879.

IN accordance with the Inspecting Committee's instructions, we beg to repeat our opinion, expressed before them on the 9th instant, respecting the alterations about to be made in the nature of the Copeland Island Light, and now state that we consider the future use of a 6-wick Trinity burner consuming paraffin oil to be preferable to the adoption of gas, the first cost and annual expenditure for maintenance being much less; the use of oil allowing the light to be made of as distinctive a character as does gas, whilst the adoption of the former illuminant would only entail an expense which would form a necessary portion of a much larger amount required, should a change again be made to gas or electricity. We are also of opinion that oil may be used with equal facility in duplex, trifurc, or quadrifurc, should it be desired.

Since the estimates for the different forms of lighting were sent in to the Board, it has become evident that in all cases where gas sirens are used in duplicate, an extra attendant will be required, and we therefore beg to draw the attention of the committee to the fact that the wages of a man, and cost of dwelling, will swell the gas estimate and lower the proportion of that for oil.

With reference to the last paragraph in the letter from the Board of Trade, in which it is stated that fuller information is required respecting the red light, and light for Mew Island, we beg to inform the committee that it was intended, if mineral oil were used at Copeland, to make use of a portion of the light on the landward side, and by means of vertical prisms to strengthen with it the outer edge of a red cut guarding Brigg's Reef and the shore up to Grey Point, if gas were used to endeavour to strengthen the cut by similar means. The light for Mew Island referred to in the estimates was to consist of a single-wick catoptric burner or argand gas burner, in the focus of a 21-inch reflector fixed at the base of the tower, and showing a red beam of light over and beyond Mew Island, guarding its north and south shores, to insure caution while rounding the outer point of the island.

We are, &c.
(signed) *James Cole*, Inspector.
W. Douglas.

The Secretary, Irish Lights Board.

— No. 8. —

Board of Trade to Trinity House.

(H. 6362.)

Board of Trade (Harbour Department),
Whitehall Gardens, S.W.,
26 September 1879.

Sir,

WITH reference to Mr. Trevor's letter of the 29th May last conveying the statutory sanction of this Board to the establishment of a first-class siren at Copeland Island, I am directed by the Board of Trade to transmit herewith copy of correspondence which has passed between this Board and the Commissioners of Irish Lights, as to a proposal to use gas at that station, both for the siren and as an illuminant for the proposed improved light, and I am to request that you will move the Corporation of Trinity House to cause this Board to be favoured with any observations which they may have to offer thereon.

I am to add that this Board have not yet signified their formal approval of the conversion of the light from catoptric to dioptric, pending the reply of the Elder Brethren to the final paragraph of Mr. Trevor's letter, above referred to.

I am, &c.

(signed) *Henry G. Calcraft.*

The Secretary to the Trinity House.

— No. 9. —

Commissioners of Irish Lights to Board of Trade.

(H. 6698.)

Irish Lights Office, Dublin,
30 September 1879.

Sir,

ANVERTING to my letter of the 15th instant, I am directed by the Commissioners of Irish Lights to forward herewith, for the information of the Board of Trade, copies of estimates alluded to therein, prepared by the engineer, showing the comparative cost of adopting the 6-wick burner consuming mineral oil, at Copeland Island Lighthouse, and a triform gaslight, with a powerful fog siren in each instance.

I am, &c.

(signed) *Owen Armstrong*
(for Secretary).

The Assistant Secretary,
Harbour Department, Board of Trade.

Enclosure 1, in No. 9.

COPELAND ISLAND LIGHTHOUSE.

Irish Lights Office, Dublin,
18 September 1879.

Sir,

I beg to submit for the approval of the Board an amended estimate for altering the light at Copeland Island to a triform light burning gas.

The amended estimate includes 600 £ for a house for an extra keeper or a mechanic, to attend to the fog-signal machinery; also extra cost of triform apparatus, but which does not include royalty to Mr. J. R. Wigham.

The amended estimate will alter the relative costs of annual maintenance for gas and mineral oil; the latter being reduced, owing to the cheapening of mineral oil; and the former increased by the items above mentioned.

I am, &c.

(signed) *Wm. Douglas.*

W. Lees, Esq.,
Irish Lights Office.

Enclosure 2, in No. 9.

COPELAND ISLAND LIGHTHOUSE.

ESTIMATED COST of altering the Light to a Dioptric Light, burning Gas, and providing a First-class Fog Siren driven by a Gas Engine.

LANTERN :					£.	s.	d.	£.	s.	d.
First-order lantern	-	-	-	-	1,233	-	-			
Taking down old lantern, fixing new lantern and carriage of material.	-	-	-	-	225	-	-			
Alteration to gallery of tower	-	-	-	-	100	-	-			
Gas house	-	-	-	-	850	-	-			
Gasmaker's house	-	-	-	-	600	-	-			
Superintendence	-	-	-	-	135	-	-			
House for fog siren and engines	-	-	-	-	650	-	-			
House for fog signal attendant	-	-	-	-	600	-	-	4,448	-	-
DIOPTRIC APPARATUS :										
Dioptric apparatus for a triform gaslight	-	-	-	-	1,708	-	-			
Light for Mow Island	-	-	-	-	68	-	-			
Carriage and fixing	-	-	-	-	99	-	-			
Temporary light	-	-	-	-	350	-	-			
Extra lamps, pipes, valves, &c., for triform apparatus	-	-	-	-	140	-	-	2,540	-	-
GAS APPARATUS :										
Gas apparatus, retort benches and pipes complete	-	-	-	-	850	-	-			
Meter-house, meters, gas pipes to dwellings and fittings	-	-	-	-	150	-	-			
Carriage of materials	-	-	-	-	75	-	-			
Superintendence	-	-	-	-	125	-	-	1,900	-	-
FOG SIREN :										
Fog siren	-	-	-	-	368	-	-			
Receivers	-	-	-	-	218	-	-			
Two engines, carriage, and erection	-	-	-	-	602	-	-			
Superintendence	-	-	-	-	55	-	-	1,800	8	-
								9,383	6	-
								928	6	9
Ten per cent. contingencies	-	-	-	-						
					£.			10,311	14	9

(signed) Wm. Douglass.

Enclosure 3, in No. 9.

COPELAND ISLAND LIGHTHOUSE.

ESTIMATED COST of altering present Light to a First Order Fixed Dioptric Light, Cost of Weeks for burning Gas in a 48-jet Burner in Triform, with a powerful Siren driven by a Gas Engine, and for burning Mineral Oil in a Six-wick Burner, with a powerful Siren driven by a Caloric Engine.

	GAS.			MINERAL OIL.		
	48-jet Burner in Triform, with Siren, driven by Gas Engine.			6-wick Burner, with Siren, driven by Caloric Engine.		
	£.	s.	d.	£.	s.	d.
Cost of works	10,311	14	9	5,470	13	2
Annual maintenance	627	3	5	846	2	6
Ordinary repairs	265	7	5	186	4	4
Special repairs	120	13	9	119	13	4
Interest on estimated outlay, at 5½ per cent.	537	8	2	208	9	6
TOTAL COST OF MAINTENANCE	1,470	17	9	900	6	6

— No. 10. —

Board of Trade to Trinity House.

(H. 6698.)

Board of Trade (Harbour Department),
Whitehall Gardens, S.W., 4 October 1879.

Sir,

REFERRING to Mr. Calcraft's letter of the 26th ultimo, on the subject of Copeland Island, I am directed by the Board of Trade to transmit herewith, for the information of the Corporation of Trinity House, copy of a further report, with amended estimate, as promised in Mr. Lees' letter of the 16th September, copy of which was sent to you on the 26th ultimo.

The Secretary to the Trinity House.

I am, &c.
(signed) C. Cecil Trevor.

— No. 11. —

Trinity House to Board of Trade.

(H. 6695.)

Sir,

Trinity House, London, E.C., 8 October 1879.

I AM directed by the Board to acknowledge the receipt of your letter of the 26th ultimo, enclosing correspondence which has recently passed between the Board of Trade and the Irish Commissioners, with respect to a proposal for using gas for the improved light at Copeland Island, and for working the new fog signal there, upon which the Board of Trade desire to have the opinion of the Elder Brethren.

This Board, by their letter of 12th March, conveyed to the Commissioners of Irish Lights their statutory approval of the conversion of Copeland Light from catoptric to dioptric, and it appears by the papers now submitted that the Commissioners desire to introduce gas, with the object of increasing its power, and still further to improve its distinctive character by means of occultations. According to their own experience, the Elder Brethren prefer oil to gas as an illuminant, and they consider that if the light be still retained as a fixed light, an intensity equal at least to that of gas can be maintained by means of oil, and even if the bi-form or tri-form system were adopted, the oil system is applicable with concentric lamps, as has been shown by the instruments constructed by Monsieur Lepaute, in Paris.

Also, if greater distinctiveness is required, it may, in the opinion of the Elder Brethren, be better attained by the adoption of the Group Flashing System, as at Caskets, when the same expenditure of oil would give a beam five or six times the power of the fixed light.

The Elder Brethren do not, therefore, from their own experience, feel disposed to advocate the adoption of gas for illumination at Copeland Island, at all events, until its greater economy can be proved; but as respects its employment in working a fog signal, the Elder Brethren have not any experience upon which to found an opinion.

I am to enclose, for the information of the Board of Trade, a statement of expenses for the last financial year at Haisbro' (gas) and Orford (oil) Light-houses, respectively, which appears, in effect, to corroborate the estimates of the Irish Commissioners.

The Assistant Secretary,
Harbour Department, Board of Trade.I am, &c.
(signed) J. Inglis.

— No. 13. —

Board of Trade to Commissioners of Irish Lights.

(H. 6895.)

Board of Trade (Harbour Department),
Whitehall Gardens, S.W.,

13 October 1879.

Sir,

I AM directed by the Board of Trade to acknowledge the receipt of your letters of the 15th and 30th ultimo further on the subject of the proposed alterations at Copeland Island Lighthouse.

In reply, I am in the first place to acquaint you, for the information of the Commissioners of Irish Lights, that the Board of Trade have this day conveyed to the Corporation of Trinity House their statutory sanction to the conversion of Copeland light from catoptric to dioptric.

With regard to the further proposal of the Commissioners to adopt gas at Copeland Island, both as the illuminant and also for working the fog-siren, I am to acquaint you that this Board, having given their careful consideration to the reports and estimates submitted to them in your letters, are not prepared to approve the introduction of gas at this station, and I am accordingly to convey to the Commissioners their sanction to an expenditure of the estimated sum of 8,470*l.* 13*s.* 2*d.*, for the purpose of altering the present light at Copeland Island into a first-class dioptric light, burning mineral oil in a six-wick burner, with a powerful siren, driven by a calorific engine.

The Secretary to the Commissioners
of Irish Lights.

I am, &c.
(signed) *C. Cecil Trevor.*

— No. 14. —

Commissioners of Irish Lights to Board of Trade.

(H. 7137.)

Irish Lights Office, Dublin,
20 October 1879.

Sir,

HAVING submitted at a special meeting of the Commissioners of Irish Lights Mr. Trevor's letter of the 13th instant, in which the Board of Trade sanction certain alterations at Copeland Island Lighthouse, but disapprove of the proposal of the Commissioners to adopt gas as the illuminant at this station, I am, in reply, directed to forward, for the information of their Lordships, a copy of a resolution unanimously passed by the Commissioners at their meeting on the 17th instant, and I am to request you will be so good as to inform me upon what date, after the 3rd proximo, it would be the convenience of the Right Honourable the President to favour a deputation of the Commissioners with an interview, to confer on the subject of their proposal that gas should be adopted as the future illuminant at Copeland Island.

The Secretary to the
Board of Trade.

I am, &c.
(signed) *W. Lees.*

Enclosure in No. 14.

COPY of RESOLUTION proposed by the Right Hon. the Lord Mayor of Dublin;
seconded by the Right Hon. the Earl of Meath.

THAT this Board has read with regret the recommendation of the Board of Trade to light Copeland Island with mineral oil, but cannot see their way to alter their opinions, before expressed, that gas is the best illuminant for this and other important lighthouses. This opinion is borne out by the experience of 14 years' trial of the system in the lighthouses under the care of the Board, and is strengthened by the reports of Professor Tyndall, their scientific adviser; and in order to explain fully to the Board of Trade the ideas of the Commissioners, that a deputation consisting of

The Earl of Meath,
The Lord Viscount Monck,
The Lord Mayor of Dublin,
Mr. Stirling,

be appointed to wait on the Board of Trade to reason with them, and point out why the Commissioners adhere to their opinion that gas is the best illuminant, and that the Secretary be instructed to write to the Board of Trade, asking them to arrange for an early appointment with Lord Sandon.

17 October 1879.

I am, &c.
(signed) J. Stirling, Chairman.

— No. 15. —

Board of Trade to Commissioners of Irish Lights.

(H. 7137.)

Board of Trade (Harbour Department),
Whitehall Gardens, S.W.,
24 October 1879.

Sir,

I AM directed by the Board of Trade to acknowledge the receipt of your letter of the 20th instant, enclosing copy of a Resolution relative to the proposal to adopt gas as the illuminant at Copeland Island Lighthouse, and inquiring with reference thereto, on what date after the 3rd proximo, it would be convenient for the President to receive a deputation of the Commissioners of Irish Lights on the subject.

In reply, I am to acquaint you that Lord Sandon will be detained in the North by official engagements until the middle of November; but upon his return to London, he will cause a further communication to be addressed to the Commissioners on the subject of your letter.

The Secretary to the Commissioners
of Irish Lights.

I am, &c.
(signed) C. Cecil Trevor.

— No. 16. —

Commissioners of Irish Lights to Board of Trade.

(H. 183.)

Irish Lights Office, Westmoreland-street, Dublin,
30 December 1879.

My Lord,

THE deputation appointed by the Board of Irish Lights Commissioners to wait upon the Board of Trade to explain the grounds on which they so urgently solicit liberty to extend further the development of gas having unfortunately failed in arranging a time for a meeting with your Lordship, which would be convenient

to both parties, and foreseeing further the impossibility on the part of the deputation of being able to arrange a meeting among-t themselves for the next two months, have thought it advisable, in the interest of the public service, to place on paper the arguments that impel the Irish Lights Commissioners to seek, without further delay, for permission to develop still more the gas system of illumination, which has been so successfully established in prominent stations on the Irish coast. The deputation, therefore, in the first place, beg to submit the following concise summary of what has taken place of late years, which they are satisfied will bear out their opinion of the superiority of gas over all arrangements of mineral or other oils as yet arrived at.

Gas was first applied at Howth Bailey in 1865, more than 14 years ago, and other six lighthouses, namely:—

St. John's Point,
Rock-a-Lall,
Wicklow Head,

Hook Tower,
Minchaul,
Galley Head,

have since been lighted with gas. The light has never failed, and its application has given the Commissioners and the sea-faring community generally the most unqualified satisfaction. They have abundant proof, from both scientific and practical men, that its introduction has been of incalculable benefit to navigation.

In 1873 the Commissioners determined to extend the advantage of the system to other lighthouses; but certain patent rights of the inventor having to be arranged between the Board of Trade and him, a considerable delay occurred, and it was not till 1876 that the Board of Trade came to an arrangement which enabled them to authorise the Commissioners to proceed with such extension of gas as they might consider desirable to lay before the Board of Trade for their sanction, the Board of Trade, on their part, intimating that they would be prepared to consider favourably any proposition the Commissioners might deem advisable to place before them.

Since then the Commissioners applied for sanction to use gas in three lighthouses: viz., Tory, Fanad, and Copeland Island; the patentee having generously offered, in these cases, to do the work without any charge for royalty, but as great expectation was entertained that the electric light could be so controlled and arranged as to make it the brightest and strongest illuminant known, this Board suggested the postponement for a time of any further action in the matter. Unfortunately the experiments with the electric light have brought out the fact, that although it is undoubtedly the brightest light known in clear weather, it is not by any means proportionally efficient in fog, when danger is greatest, and when light is most wanted by the seaman.

Nothing has occurred since 1865 to alter the opinion of the Commissioners as to the superior value of gas in lighthouses as compared with oil. These advantages have been proved by the experience of 14 years, and during that time, the patentee has introduced many important improvements, which have made it additionally valuable, especially to meet the requirements of thick weather, not only in the case of fixed lights, but also in applying the system to revolving lights; in both cases giving to the lighthouse-keeper the power of instantaneously increasing the light according as the state of the atmosphere may render it necessary, from a light equal to 430 candles to a light, as in the case of Galley Head, equal to 5,000 candles. The Trinity House has recognised these advantages, and has not only had the two houses at Haslebro' lighted by gas on Mr. Wigham's system, but has applied the same principle, to a certain extent, in the introduction of a six-wick oil lamp, by which the light from oil is increased in thick weather, but to a feeble extent as compared with that attained by gas, and probably very feeble indeed to that attainable by gas in its further development.

As these improvements were brought under the notice of the Commissioners, their scientific adviser, Professor Tyndall, from time to time investigated them, visiting Ireland for this purpose. His reports have been uniformly favourable, and his recommendations for the adoption of these improvements have been acted upon by the Commissioners, with the sanction of the Board of Trade. On the recent occasion of his visit to Galley Head, after giving his own opinion and those of other scientific men in favour of gas for lighthouse purposes, he says,
"No

"No words of mine could add any force to the consensus of evidence here brought forward; and when we remember the calamities which have occurred even in the neighbourhood of lighthouses through inability to see the light, it surely behoves us not to throw away the chance of mitigating such calamities by the employment of a light capable of behaving in thick weather in the manner described by Sir William Thompson, Mr. Gray, and Mr. Hamilton; and in describing the effect of the Galley Head Light, when it was lost beneath the horizon, he says: "In the cloudy air above the lighthouse every pulse of the flame was distinctly visible after the direct beam had disappeared. I cannot but think that these atmospheric thrills will prove of great importance to the mariner, even in atmospheres thick enough to render the light itself invisible." His impression of the light was, "On the whole he had never seen a finer light;" and, in conclusion, he adds, "that gas lends itself with admirable freedom to any change in its mode of application which it may be thought desirable to make. The suppression, for example, of the flashing apparatus at Galley Head would convert that light into an ordinary revolving light, surpassing any other in the world. Indeed, were the power of the burner reduced to 48 jets instead of 68 jets, the light with its full strength invoked, would still transcend all other revolving lights." Three facts appear to the Commissioners conclusively to show that they were fully justified in making the recent proposal to use gas in the three lighthouses above referred to, and thus secure to the maritime public the advantages of this superior system of lighthouse illumination, and in this view they are glad to know they are supported by the Elder Brethren of the Trinity House, who state, at the conclusion of the report on the exhaustive experiments made at Hablestree, by direction of the Board of Trade, on the use of gas for lighthouses, that "if called on to advise the Board of Trade in that respect, they would be prepared, in deference alike to the wishes of the Irish Board, and to the strong opinion in its favour of their valued adviser, Dr. Tyndall, to recommend that the Irish Commissioners, who take so great an interest in it, should have authority for the expenses of proceeding further with its development."

The deputation think it their duty to remind the Board of Trade that the principle of sanctioning additional first outlay, when there is a fairly acknowledged expectation of increased benefits to navigation in view, has not only been carried out in the case of these lighthouses already lighted by means of gas, but in those where the electric light is the illuminant. From a Parliamentary Paper (13th June 1879), which the Commissioners have lately received, they find valuable evidence given by Mr. Farrer, Secretary to Board of Trade, Sir Richard Cullinson, Deputy Master to the Trinity House, and Mr. Douglass, its engineer, respecting the electric light as applied to lighthouses. From this evidence it appears that large sums have been sanctioned by the Board of Trade for experimental trials of the electric light, in view of applying it to lighthouses. The total first cost of the electric light at four stations is as follows:—

FINER COST.

	£.	s.	d.
Dungeness - - - - -	11,600	-	-
Souter Point - - - - -	17,300	-	-
South Foreland (two towers) - - - - -	25,000	-	-
Lizard (two towers) - - - - -	22,500	-	-

MAINTENANCE.

	£.	s.	d.
Dungeness - - - - -	1,588	7	2
Souter Point - - - - -	1,834	16	11
South Foreland (two towers) - - - - -	2,771	9	3
Lizard (two towers) - - - - -	2,205	6	4

TABLE of comparative First Cost and Annual Maintenance of Electric and Oil Lights, taking the case of the Lizard Fixed Light, which shows most favourably for the Electric Light.

	£.	s.	d.
Lizard (first cost) <i>one tower</i> - - - - -	11,250	-	-
Compared with oil - - - - -	6,500	-	-
Shows greater first cost electric light - - - - £.	4,750	-	-
Lizard, annual maintenance, <i>one tower</i> - - - - -	1,152	13	2
Compared with oil - - - - -	681	17	3
Shows greater cost, per annum, electric light - - - £.	470	15	11

With regard to the only Revolving Light:—

Souter Point, first cost, electric light - - - - -	17,300	-	-
Oil, similar light - - - - -	7,000	-	-
Greater first cost electric light - - - - - £.	10,300	-	-
Souter Point, annual maintenance - - - - -	1,834	16	11
As against similar oil - - - - -	719	7	3
Shows greater annual cost of electric light - - - £.	1,115	9	8

The deputation beg the Board of Trade to believe, that in bringing forward these figures, they highly appreciate the sound policy of the Board of Trade in thus affording the Elder Brethren facilities to work out a problem, namely, the applicability to lighthouse illumination of the electric light, the solution of which must be of the highest importance to humanity, and that they only refer to them in the sanguine hope that the same opportunity, to a certain limited extent, may be afforded to the Commissioners to work out their gas system, which has already given so fair a promise of proving such a grand boon to the commerce of the United Kingdom; its superiority in dirty weather and in fogs, is well worthy of considerable additional first outlay, and, if it were the fact, in annual maintenance also, but in the annexed statement it is clearly shown, that candle light for candle light gas is considerably the cheaper; but the Commissioners, feeling the high responsibility placed in their hands of affording to the large and increasing sea-faring population all the improvements in coast illumination that science, from time to time, develops, have always been anxious to adopt every improvement calculated to save life and property, and in this principle they feel confident they are supported by the general opinion of the country, and they are further fortified in firmly adhering to this principle by the statement of Mr. Farrer, given in evidence before a Committee of the House of Commons, that "the cost of a lighthouse is as nothing compared with its value to the mariner," adding that this is not only his own opinion, but the principle upon which the Board of Trade deals with such expenditure.

In accordance with directions, on 7th July 1879, the Commissioners forwarded to the Board of Trade estimates drawn out by their engineer, of the relative cost of a first order dioptric mineral oil light with powerful fog siren for Copeland Island, and a first order gas light with powerful siren for same place:—

Estimated cost of gas light - - - - -	£.	s.	d.
" " mineral oil - - - - -	9,437	6	9
	8,470	13	2

The Board of Trade, though strongly urged by the Commissioners to adopt gas, returned an answer that they would only sanction 8,470 l. 13 s. 2 d., for mineral oil. The deputation do not wish to dwell on the dissatisfaction of the Commissioners at this curt decision, unaccompanied by any reasons; but they think it right to state here, that the patentee sent in, without any authorisation from

from the Commissioners, a tender for the erection, at Copeland, of a first class dioptric *triform* gas light and powerful siren for a somewhat less sum than that afterwards authorised by the Board of Trade for a mineral oil light, the highest illuminating power of the oil being 722 candles, that of the gas being 1,288 candles, including patentee's rights and the new developments of gas not as yet exhibited; the works to be under the superintendence of the engineer of the Board, and to be approved of by him; this tender the deputation are prepared to lay before the Board of Trade and to recommend its acceptance.

The deputation have to observe, that Copeland Island, being not only a leading light to all going up or down Channel, but also one of considerable importance to vessels seeking shelter in the Bonger roadstead, is situated in a locality where heavy mists and fogs abound during a considerable period of the year; and the deputation beg leave to draw the attention of your Lordship to the following quotation from the report of the Inspecting Committee of this Board, dated the 12th September 1879, in reference to this light, in which the deputation fully concur: "In their opinion this light is one of the most important in Ireland to the large amount of passing shipping, they therefore consider that it should be a first class light, capable of being augmented during fogs to the highest pitch at present known; they therefore, notwithstanding the joint report of the Inspector and engineer (which they recommended to be forwarded to the Board of Trade) adhere to their recommendation, founded on the expressed opinion of Dr. Tyndall in his report on gas, that gas should be the illuminant, it being the only one as yet proved by experience capable of being augmented to duplex or triform, as necessity may require."

The deputation beg to present with these observations, a statement, prepared by Mr. Wigham, of the relative cost of mineral oil and gas, in its varied modifications, with comparative power of each in illumination, which is the only just basis on which an opinion can be formed.

We have, &c.
(signed) *John Barrington, Esq.,*
Lord Mayor of Dublin.
Meath.
James Stirling.
Moscow.

The Right Hon. The Viscount Sandon, M.P.,
President of the Board of Trade.

Enclosure in No. 16.

MEMORANDUM OF ANNUAL COSTS.

No. 1.

PARAFFIN.

Six-wick lamp, burning three outer wicks only, costs 8 s. 8 d.	£.	s.	d.
per night, for 305 nights (clear weather), say - - -	112	5	-
Six-wick lamp at full power (foggy weather) costs 11 s. 10 d.			
per night, for 60 nights, say - - - - -	35	12	-
	£.	157	17 - per annum.

Maximum illuminating power, 722 candles.

No. 2.

TRIIFORM GAS LIGHT.

(As recommended by Mr. W. Douglass).

One 28-jet burner costs 6 s. 8½ d. per night, for 305 nights,	£.	s.	d.
say	102	6	-
Three 28-jet burners cost 1 l. - s. 2 d. per night, for 60 nights,			
say	60	10	-
	£.	162	16 - per annum.

Maximum illuminating power, 1,288 candles.

Cost of paraffin greater than gas by 6 l. 1 s.

Illuminating power of gas greater than that of paraffin by 566 candles.

No. 3.

One 28-jet burner for 305 nights	-	-	-	-	£.	s.	d.
					102	6	-
Three 48-jet burners cost 1 l. 16 s. 8 d. per night for 60 nights,					110	-	-
say							
					£.	212	6 - per annum.

Maximum illuminating power, 2,496 candles.

Cost of paraffin less than gas by 44 l. 9 s.

Illuminating power of gas greater than that of paraffin by 1,774 candles.

Note.—These figures as to paraffin are taken from the Trinity House Table, Parliamentary Paper C. 1,151, 1875, page 64, but in this calculation the price of paraffin is reduced to that now paid by the Commissioners of Irish Lights, and instead of taking one-half for the consumption of paraffin in clear weather, I take the actual consumption of the three outside wicks, as it is the three inside wicks which are turned down in clear weather. The consumption of the three outside wicks is much more than half, they being so much greater in circumference. The figures as to gas are also taken from same Parliamentary Paper, page 44. Particulars of burners are as under:—

SINGLE GAS BURNERS.

Nature of Burner.	Illuminating Power in Candles.	Consumption per Hour in Cubic Feet.	Cost per Hour.	Cost per Night (12 Hours).
			s. d.	£. s. d.
28-jet - -	429.6	51.4	- 6.73	- 6 8.3
48-jet - -	822	92.2	1 - 2	- 12 3
68-jet - -	1,213.12	142.5	1 7.3	- 19 5.6
88-jet - -	2,608	244	2 9.2	1 12 2.2
108-jet - -	3,923.4	368	3 4.6	2 - 7.8

TRIIFORM GAS BURNERS.

Nature of Burner.	Illuminating Power in Candles.	Consumption per Hour in Cubic Feet.	Cost per Hour.	Cost per Night (12 Hours).
			s. d.	£. s. d.
28-jet - -	1,288	154	1 8.3	1 - 9
48-jet - -	2,496	270	2 - 8	1 15 8
68-jet - -	3,750	439	4 10	2 17 11
88-jet - -	7,224	732	8 - 6	4 16 7
108-jet - -	8,770	924	10 2	6 1 11

TABLE showing the Comparative Annual Cost of Paraffin and Gas, taking into account the Maximum Illuminating Power in each case.

Annual cost of producing an illuminating power of 100 candles :

	£.	s.	d.
With six-wick paraffin lamp burning three wicks for 305 nights, and six wicks (full power) for 50 nights -	23	5	-
With triform gas, 28-jet burner for 305 nights, and two other 28-jet burners for 60 nights -	12	12	9
With triform gas, 28-jet burner for 305 nights, and 3-48-jet burners for 60 nights -	8	10	1
With triform gas, 28-jet burner for 305 nights, and 3-68-jet burners for 60 nights -	7	6	9
With triform gas, 28-jet burner for 305 nights, and 3-88-jet burners for 60 nights -	5	8	6
With triform gas, 28-jet burner for 305 nights, and 3-108-jet burners for 60 nights -	5	6	8

Or reduced to a unit of one candle power.

Annual cost of producing an illuminating power of one candle :

	£.	s.	d.
With paraffin burned as above -	-	4	8
With triform gas as above, 28-jet burner -	-	2	6
" " 48-jet -	-	1	8
" " 68-jet -	-	1	5
" " 88-jet -	-	1	1
" " 108-jet -	-	1	-

— No. 17. —

Board of Trade to Commissioners of Irish Lights.

(H. 183.)

Board of Trade (Harbour Department),
Whitehall Gardens, S.W.,

8 January 1880.

Sir,

I AM directed by the Board of Trade to acknowledge the receipt this day of the letter, dated the 30th ultimo, addressed to the President, and signed by the ex-Lord Mayor, the Earl of Meath, Mr. Stirling, and Viscount Monck, upon the subject of the proposed adoption of gas at Copeland Island, and the further development of that illuminant for lighthouse purposes in Ireland, and I am to state that the communication will receive the careful attention of the Board of Trade.

I am, &c.

(signed) C. Cecil Trevor.

The Secretary to the Commissioners of Irish Lights.

— No. 18. —

Board of Trade to Commissioners of Irish Lights.

(H. 183.)

Board of Trade (Harbour Department),
Whitehall Gardens, S.W.,

26 February 1880.

Sir,

WITH further reference to the letter of the 30th December 1879, addressed to the President, and signed by the ex-Lord Mayor, the Earl of Meath, Mr. Stirling, and Viscount Monck, on the subject of the proposal to introduce gas at Copeland Island, and its further extension as a lighthouse illuminant in Ireland, I am

343—Sess. 2.

c 4

directed

directed by the Board of Trade to request that you will submit the following observations for the information of the Commissioners of Irish Lights.

In their letter the Commissioners express their regret that the Board of Trade should have sanctioned the introduction of mineral oil at Copeland Island in preference to gas, and state that Mr. Wigham had previously submitted a tender for the erection at that station of a first-class dioptric triform gas light and powerful siren for a somewhat less sum, including patentee's rights, than that afterwards authorised by the Board of Trade for mineral oil.

The Commissioners also state that they are prepared to recommend the acceptance of this tender, and they forward a statement by Mr. Wigham, the gas patentee, in which he endeavours to show that the cost of maintaining the triform gas light is less than that of mineral oil with the six-wick burner.

The Commissioners further call the attention of the Board of Trade to the success which has attended the use of gas at the lighthouse stations in Ireland at which it has been already introduced, and urge that its susceptibility of great and rapid increase of power in thick weather justifies its extension to other stations, notwithstanding the considerable first outlay and annual cost of maintenance.

In support of this view the Commissioners call attention to the great expense incurred for the establishment and maintenance of the electric light, the development of which by the Trinity House has been approved by the Board of Trade.

With reference to Mr. Wigham's tender, I am to point out that the Board of Trade now bear of its existence for the first time, and have hitherto only had before them an estimate for the erection of a gas light at Copeland Island much higher than that for mineral oil.

As regards Mr. Wigham's statement of the cost of gas, I am to observe that it appears to be open to serious criticism, particularly that portion of it which relates to the use of the triform light with three 28-jet burners for 60 nights in the year. For although in pages 44 and 45 of the Parliamentary Paper relating to the results of the Halsbro' experiments, on which Mr. Wigham's calculations are based, it is estimated that the proportional yearly cost of each 28-jet burner will be only 115 *l.* 18 *s.* 10 *d.*, when an average hourly consumption of as much as 120 cubic feet of gas is required, the whole annual cost of such a station is stated to be 270 *l.* 13 *s.* 7 *d.*, and on page 44 of the same paper it is distinctly stated that where an average hourly consumption of only 51·4 cubic feet of gas is required, the annual cost will be 186 *l.* 9 *s.* 4 *d.* for the station.

As Mr. Wigham's estimate appears to assume an average hourly consumption of 68·3 cubic feet of gas, the total cost, adding the cost of the additional quantity of canal coal and lime required, as shown on page 43, will be 207 *l.* 4 *s.* 2 *d.*, instead of 182 *l.* 16 *s.*, as stated.

In like manner the cost of the arrangement for introducing the triform gas light with three 48-jet burners for 60 nights in the year would be 232 *l.* 9 *s.* 9 *d.* per annum, instead of 212 *l.* 6 *s.*, as stated by Mr. Wigham.

In the experience of the Board of Trade, however, the comparative estimates based upon the experiments at Halsbro' are not borne out, and it is clear from the lighthouse accounts of the Commissioners at the Board of Trade that the average annual cost of the six lighthouse stations in Ireland (omitting Galley Head), where gas has been introduced, exceeds the cost of maintaining a station where mineral oil with the six-wick burners is used, by at least 129 *l.* per annum, and that of a station where the illuminant is mineral oil with the four-wick burner by at least 220 *l.* per annum, taking into account the interest on the greater original outlay for gas and the remuneration to Mr. Wigham for the use of his patents.

With regard to the electric light, I am to observe that the Trinity House, on account of the great cost of this mode of illumination, have not hitherto proposed to extend its use beyond the three stations at which it has already been introduced.

The Board of Trade wish to express no final opinion against gas either at Copeland or elsewhere, but they think it only right to be as clear as possible on the subject of cost before proceeding further.

With this object they desire me to request that they may be furnished with an estimate (revised by the Commissioners, with the help of their engineer) of the first cost of introducing gas at Copeland Island (including the first cost of the

the fog signal), in the manner now proposed by the Commissioners, and also of the annual cost of maintenance.

The Board of Trade request that the tender of Mr. Wigham referred to in the Commissioners' letter may be forwarded for the information of the Board.

I am, &c.

(signed) T. H. Ferrer.

The Secretary to the Commissioners of Lights.

— No. 19. —

Commissioners of Irish Lights to Board of Trade.

(H. 2526.)

Irish Lights Office, Dublin,

10 April 1880.

Sir,

In reference to the Board of Trade's letter of the 26th February last, I am directed by the Commissioners of Irish Lights to forward, for the information of the Board of Trade, the statement of Mr. Wigham, in answer to the criticisms passed upon his calculations relative to the cost of gas in its various forms, which appears to the Commissioners to explain so very clearly the apparent discrepancies between Mr. Wigham's former statement and the remarks made on it by the Board of Trade, that they feel they have nothing to add to it.

I am, however, desirous to observe that the allegations of the Board of Trade relative to the very much greater average cost of the six lighthouses in Ireland where gas has been introduced, compared with the cost of maintaining a station where mineral oil is used, have caused the Board to inquire closely into the relative actual cost of lighting with gas and oil.

The Board have not any six-wick burner oil lamp, and they cannot, therefore, from their own accounts, institute any comparison between gas and oil applied in that form; but they have compared the average actual cost of lighting three first class mineral oil lights with four-wick burners, being the only lights of that sort which have been in use for more than 12 months, viz.:—

Killybegs (St. John's Point),
Ballycotton,
Kinsale (Old Head),

and five similar first class gas lights, viz.:—

St. John's Point (County of Down),
Rocknall,
Hook Tower,
Wicklow Head,
Miscnall

(Howth Bailey being omitted in consequence of the many gas experiments that have been made there), and the result of their investigations is as follows:—

	£.	s.	d.
Average actual cost of maintaining five gas-lighted stations with a maximum of 2,823 candles, for the year ending 31st March 1879 -	364	13	8
Average actual cost for the same period of maintaining three stations lighted with four-wick mineral oil lamp, with a maximum of 328 candles -	297	8	9
Excess of gas - - - - -	£.	67	4 11

(See Enclosure 2, page 28.)

The above comparison is made with respect only to the annual cost of maintaining each description of light. The original outlay for erecting the gas apparatus is larger than that for the appliances necessary for oil, but the Commissioners are of opinion that the superior efficiency of the former illuminant,

nant, capable of instantaneous increase, in emergency, from 420, to 8,700 candles; as against 722 candles, the highest illuminating power to be obtained from oil, entirely justifies, in the case of important lights, the additional first cost, and the increased amount of annual maintenance.

With respect to the Copeland Island Light, the estimate of Mr. Douglass (the Board's engineer), for erecting the necessary works for an oil lamp (six-wick burner), with siren and calorific engine, was, in December 1878, 8,470 *l.* 13 *s.* 2 *d.*, and for a gas (one light), with gas siren, 9,437 *l.* 6 *s.* 9 *d.*

On revision, Mr. Douglass now thinks that, in consequence of the rise in the price of metals, the estimate for mineral oil light should be increased by 140 *l.*, making it now 8,610 *l.* 13 *s.* 2 *d.*, and, for a gas station, should be increased by 195 *l.*, making the estimate now 9,632 *l.* 6 *s.* 9 *d.*

	£.	s.	d.
Mr Wigham's tender for the whole expense to be incurred in lighting with a triform gaslight and gas siren, as in his proposal of the 18th September 1879, is - - -	8,930	-	-
Less, if allowed to utilise an existing house of which the Board approves - - - - -	590	-	-
£.	8,430	-	-
Appliances for lighting "Mew" Island and "Briggs" Rock, and providing a temporary light to be used during the construction of the works, of equal power with the present light, as since suggested by the Board - - -	475	-	-
£.	8,905	-	-

The comparison of mineral oil with gas cannot be fairly instituted, without taking into account the enormously increased power which can be obtained with facility and instantaneously, in the use of the latter light.

For lights in less important positions, mineral oil may answer, but for grand leading lights, or in particularly dangerous localities, there can be no question as to the superiority of gas as an illuminant; the utmost extent of illumination of mineral oil being 722 candles, while that of gas attains, in quadriform system, to 8,700 candles.

In clear weather a very low amount of illuminating power is sufficient to show on the horizon, such as that of a four-wick mineral oil burner, or its equivalent, a 28 jet gas-burner; but when danger really is imminent, and that the highest amount of illumination known is required to save life and property in dense fog, then gas comes to the front, transcendently effective, throwing out through the fog (and when unable to pierce it, illuminating it) a light of 8,700 candles, while the six-wick mineral oil burner is choked and buried with its modicum of 722 candles. In support of this statement, the Commissioners think it will be interesting to the Board of Trade to have before them, certificates from practical mariners as to the efficiency of the gas light.

The principle the Commissioners have invariably tried to carry out to the utmost of their power has been lately ably advocated by Mr. Farrer in his evidence before a Parliamentary Committee on gas, where he stated that, "The cost of a lighthouse is as nothing compared with its value to the mariner;" and added that, "This was not only his own opinion, but the principle upon which the Board of Trade deals with such expenditure." Considering therefore, the immense superiority of the illuminating power of gas under those foggy conditions of the atmosphere, so frequent around our coasts, when the lives of the crew and the safety of the cargo are in the balance, and everything depends upon a glimmer through the surrounding darkness for the salvation of life and property, the Commissioners feel a confidence that the Board of Trade will no longer hesitate to grant them authority to proceed at once, with a gas-triform illumination at Copeland Island.

The estimates for the erection of the works necessary for lighting Copeland Island with mineral oil and gas, were prepared for the Board by their engineer in December 1878, and transmitted to the Board of Trade in July 1879. The Commissioners now beg leave to lay before the Board of Trade a revised estimate by their engineer for the erection of the necessary buildings

Enclosure 3.

Enclosure 4 to 8.

ings and appliances for introducing gas at Copeland Island (including first cost of fog signal), amounting in the whole to 10,338 *l.* 18 *s.* The cost of maintenance is estimated by the Board's engineer at 810 *l.* 5 *s.* 9½ *d.*

The Commissioners also forward to the Board of Trade, Mr. Wigham's tender, dated 11th March 1880, accompanied by plans and specification for lighting Copeland Island with gas, amounting to 8,930 *l.*, to be reduced, if allowed to utilize an existing building, to which the Board has consented, making his tender 8,430 *l.*

They likewise beg leave to call the attention of the Board of Trade to a letter by Mr. Wigham, dated the 17th March 1880, meant to accompany his tender, which shows the work he proposes, at the suggestion of the Board, to execute at Copeland Island, in addition to that contemplated when his original tender (now transmitted) was sent in in September 1879. The additional works, amounting to 475 *l.*, added to the former tender of 8,430 *l.*, make a total of 8,905 *l.*, and accounts for the increase in the amount of that tender.

I am, &c.

(signed) *W. Lees*, Secretary.

THOMAS H. FARRER, Esq.,
Secretary to the Board of Trade,
London, S.W.

Enclosure 1, in No. 19.

33 to 36, Copel-street, Dublin,
4 March 1880.

Sir,

REFERRING to the copy of a paragraph of a letter from the Board of Trade to the Commissioners of Irish Lights, which you transmitted to me for my explanation, I beg to say that I think the Board of Trade will find on looking further into the Parliamentary Papers to which they refer, that my statement is not incorrect, but that they have fallen into the error of supposing that the sum of 186 *l.* 9 *s.* 4 *d.* (pages 43 and 44) represents the annual cost of a 28-jet burner consuming 51·4 cubic feet per hour, the consumption of the establishment being on an average 120 feet per hour. On the next page Mr. Valentin gives the true cost, viz., 115 *l.* 18 *s.* 10 *d.*, and says "The real advantage of the Wigham gas burner consists not so much in its furnishing a somewhat cheaper light equal in power to the oil light now in use, but in its capability of producing lights of varying illuminating powers, some of which have never been, and probably never will be, obtained by oil lights, also in its adaptability for flashing purposes and signal lights. The higher power lights come so much cheaper because the cost of making larger quantities of gas, which is represented by wages, interest on plant, &c., remains pretty well the same. It is here in fact where its undisputed advantage lies. This becomes clear at once if the hourly consumption of gas be taken at 120 cubic feet, a consumption which both Mr. Douglass and Mr. Wigham are agreed upon will be sufficient for clear as well as foggy weather."

At page 54, Dr. Tyndall says in reference to this subject: "There is one point in connection with the 28-jet burner, which in justice to its inventor I must here signalise. Anxious to give the Elder Brethren the maximum of information, Mr. Valentin has stated in a table the cost of the 28-jet burner, supposing it to be pitted at Haisbro' against the four-wick lamp. In that table he debits the small burner with the whole of the gas-maker's wages, and with the whole of the interest on 1,685 *l.* 6 *s.* 9 *d.* Now the gas maker is there not to produce gas for a 28 jet burner only, but for a series of fog burners culminating in one of 108 jets. He manufactures not 51·4 feet an hour, but an average of 120 cubic feet an hour. Were it, moreover, proposed to erect works for a 28-jet burner, an idea to my knowledge not entertained, a fraction of 1,685 *l.* 6 *s.* 9 *d.* would cover the cost."

It will therefore be seen that the Board of Trade are mistaken in supposing that the annual cost of the trifurc burner at Copeland, when 3-28-jets are used for foggy weather, would be 207 *l.* 4 *s.* 2½ *d.*, and when 348-jets are used, 223 *l.* 9 *s.* 9 *d.*, the real cost being 192 *l.* 16 *s.* and 212 *l.* 0 *s.* respectively, as stated by me.

With respect to the general question of the cost of gas as compared with oil, it was shown at Haisbro' that gas was much cheaper than coal oil even without taking into account its superior illuminating power. I thought it was clearly understood that the investigation at Haisbro' which was ordered by the Board of Trade, was to be considered final and conclusive on that point. I believe that Dr. Tyndall, Mr. Valentin, Mr. James Douglass and myself, endeavoured to make it so, and took great pains to demonstrate the true cost, not on any theoretical basis, but by actual practice, and with this view the process of manufacture was carefully watched and noted day after day for a very considerable time. I am perfectly confident that the cost of using gas for lighthouses was then really arrived at.

at, of course subject to variation in the price of coal, &c., and if, as stated by the Board of Trade, the accounts of six gas stations in Ireland show a greater cost than stations where mineral oil is used, gas being charged with interest upon the original outlay, and the money paid to me for patent rights, I can only suppose in the absence of any data as to the nature of this excess.

1st. That perhaps the system of manufacture originally fixed upon at Haisbro' is not adopted,* or

2nd. That the cost of preliminary experiments, as well as the cost of patent rights, is included in what the Board of Trade term original outlay. This I think bears more hardly on gas than on oil lights, with which from time to time there have also been many experiments, without, so far as I know, debiting them with interest.

But even supposing it is considered right to adopt this course, and that there is this excess of cost, which in my mind ought not to exist, I respectfully submit that the sum of 139 l. which the Board of Trade say is the excess of gas over mineral oil (six-wick burner) is not extravagant when the greater illuminating power of the gas is taken into account. The four-wick lamp is quite sufficient to show light at the horizon to the mariner in clear weather, and it is evident that it is only in thick weather that a superior light is required. The Board of Trade have recognised this in sanctioning the use of the six-wick lamp in place of the four-wick lamp at an increased annual expenditure of 91 l. to gain a maximum increased illuminating power of 394 candles (the difference between the illuminating power of the four-wick and six-wick lamps). It is perhaps, therefore, not unreasonable for me to suppose that they should not object to an expenditure of this 139 l. to secure a further increased illuminating power of 2,301 candles (the difference between the maximum illuminating power of the six-wick lamp and that of the gas lights in Ireland), especially when for a very small additional cost they may secure by the use of the tri-ferum a greater light than that of the six-wick oil lamp of more than 8,000 candles. You are aware that these figures as to illuminating power are not mine, but are those fixed at Haisbro' as was also the table of cost upon which my statement as to costs, which includes interest on outlay and all renewals of apparatus, is based.

As requested, I herewith inclose a formal tender, in accordance with my proposals of the 16th September and 16th October 1879, for altering Copeland from a centrifric oil station to a first order diaphric gas station, and I ask your attention to the fact that although Mr. William Douglass, in his printed report respecting Galley Head, recommends only 28-jet burners to be used in the tri-ferum, my tender provides that all sizes from 28 to 106 jets may be used in each tier of the optical apparatus as the state of the weather may require. The maximum light from these burners is 8,769 candles, an amount of light which cannot fail to be of great value to the navigation of that part of the coast of Ireland.

Wm. Lees, Esq.,
Secretary to the Commissioners of Irish Lights.

I am, &c.
(signed) John R. Wigham.

See Enclosures 9,
12, and 13.

Enclosure 2, in No. 19.

RETURN of EXPENSES for Year ended 31st March 1879.

MINERAL OIL.						G A S.					
STATION.	Wicks and Accessories.	Oil.	House Coal.	Expenses, &c.	Total.	STATION.	Wicks and Accessories.	Gas and Pressure Oil, &c., &c.	House Coal.	Expenses, &c.	Total.
Ballycotton - - -	£. s. d. 275 12 3	£. s. d. 18 4 -	£. s. d. 18 8 -	£. s. d. 40 4 0	£. s. d. 312 14 10	Wicklow - - -	£. s. d. 177 12 11	£. s. d. 83 5 -	£. s. d. 58 12 8	£. s. d. 298 14 7	£. s. d. 319 10 6
Kilmore - - -	110 12 4	40 4 8	10 - -	62 14 3	223 11 5	Black Tower - -	178 3 0	108 12 7	37 6 -	30 0 0	325 8 7
Killybegs Point. (St. John's Point).	128 12 10	40 12 8	30 - -	40 8 10	239 1 8	St. John's Point -	181 12 10	30 12 8	18 - -	15 0 0	235 12 8
						Redoubt - - -	191 12 1	100 7 1	45 - -	110 0 -	298 12 1
						Blackhead - - -	118 1 7	72 12 0	17 12 -	18 - 1	208 11 7

This return of expenses is given, made out by the accountants from the office books, and verified as correct, but since then found to be incorrect in the original of the report in order to enable him to test the accuracy of the figures, and when the return is as above shall be sent to the Board of Trade.

16th Light Office, Dublin,
17 March 1880.

* You are aware that some time since I formally offered to secure this, and ensure that the proper course should not be exceeded by contracting to supply gas at all gas stations; and I am still willing to enter into some such arrangement, should you think it desirable.—J. R. W.

Enclosure 3, in No. 10.

THE following TESTIMONY has been received respecting the Illumination of Fog by the
GAS FOG BURNERS used at LIGHTHOUSES.

From Captain *J. A. Beaumont*, L. and N. W. Express Steamer "Shamrock."

Holyhead, 29 September 1879.

I think it only right to acquaint you that I have had the greatest satisfaction with your fog gaslight at Howth Baily Lighthouse. I commanded one of the London and North Western express steamers between Holyhead and Dublin, and in foggy weather, when the fog has been so dense as to obscure every light, and nothing has been visible half a ship's length off, I have observed the effect of the light of the Baily Lighthouse upon the sky like a glow upon the mist, something similar to the rising of the moon in cloudy weather, and have thus known my position, although the light of the lighthouse itself was perfectly invisible. This has happened several times, and I think that in establishing this gaslight, which thus makes itself seen in dense fog, you have done a great service to navigation, for which every sailor should thank you.

J. A. Beaumont.

From Captain *Roe*, Steamer "Eleanor."

Dublin, 25 February 1880.

I FULLY endorse Captain Beaumont's opinion respecting the Baily Light, as expressed in his letter to you as to its usefulness in foggy weather. Its behaviour in fog is just as he describes.

John Roe.

From Captain *Aitken*, S.S. "Shamrock," of Glasgow.

Dublin, 25 February 1880.

You have asked me my opinion as to the fog penetrating quality of the lights of Howth Baily and Rockabill, and I have no hesitation whatever in saying that I consider them both most valuable lighthouses. The light which they throw down upon the sea, and throw up into the sky in fog, is of great service to us in passing, for it shows us where the lighthouse is when the weather is so thick that we could otherwise see nothing. I have frequently been unable to see these lighthouses by reason of the fog, and yet have been enabled to tell where they stand by means of the beam of the light on the atmosphere.

Robert Aitken.

From Captain *Walker*, S.S. "Magnet."

Dublin, 25 February 1880.

IN reply to your inquiry I beg to say that when I have not been able to see the Baily Light on foggy nights, I have yet accurately known its position by reason of the halo which appears to pervade the atmosphere surrounding it when its fog powers were displayed.

Thompson Walker.

From Captain *Lewis*, S.S. "Adela."

Dublin, 28 February 1880.

IN answer to your question I have no hesitation in saying that the Baily Light is of great use to seamen entering Dublin Bay. I have noticed the peculiarity to which you refer, and consider that any light which will send a radiance towards the sky and towards the sea as well as straightforward, is invaluable.

Walter Lewis.

From Captain *Dunne*, "Countess of Dublin."

North Wall, 3 March 1880.

I HAVE made careful observations of the Baily Light for some years back, and I can state that in thick weather I have been able to ascertain its position by means of the glow which I have observed above it when I could see no light except this glow. I understand that this means of showing a great light to illuminate fog is peculiar to the gas burner used at the Baily, and I can only say that I consider it a very great advantage and an improvement on the ordinary lighthouse lights.

David Dunne.

From Captain Brodie, S.S. "Caledonian."

North Wall, Dublin, 4 March 1880.

In answer to your inquiry respecting Howth Baily and Rockabill Lights, in fogs or misty weather; I have often seen the illumination of the lights when I could not see the light itself through the fog.

William Brodie.

From Captain Triphook, Mail Steamer "Ulster."

Moylough Rectory, Ballinacree,
11 March 1880.

In reply to your inquiry, I beg to say that in my opinion the property possessed by the Howth Baily Lighthouse of throwing beams of light skywards in foggy weather as well as downwards towards the sea, is very beneficial to mariners. I have been able to ascertain the bearing of the Baily Lighthouse by this illumination of the fog when I could not see the ordinary light of the lighthouse.

R. S. Triphook, J.P.,

Co. Galway.

Late Commander "Ulster" Royal Mail Packet.

From Captain J. Slaughter, R. M. S. P. "Munster."

1 March 1880.

In reply to your question, I cheerfully give my testimony to the usefulness of the Howth Baily Light in foggy weather. The effect of the light upon the fog and mist is very remarkable, enabling us to know the position of the lighthouse even when its direct beam is quite obscured.

Chas. Jas. Slaughter,

Commander, R.N.

From John P. Griffith, Esq., C.E., Assistant Engineer to the Port and Docks Board of Dublin.

At a meeting of the Institution of Civil Engineers, held in London, on the 25th March 1879, Mr. Griffith said that "Gas had been largely used in lighthouses round the coast of Ireland, and was looked upon with much favour by seafaring men, especially on the ground of its efficiency in bazy weather. This opinion he could confirm from personal observation, for when crossing the Irish Channel, he had been much struck by the glow or illumination of the haze above the Baily Lighthouse at the entrance to Dublin Bay. He has observed this long before the light itself was visible, and it was no doubt due to the large glow of divergence resulting from the size of the flame."

From Captain A. K. Gahney, Commissioner of Irish Lights Steamer "Alexandra."

Kingstown Harbour, 17 September 1875.

Having been directed by the Board to report as to the effect of the "Flashing Triform Light" which has been exhibited at Howth Baily for some time back, in comparison with the ordinary light of the lighthouse there, I beg to say that on two occasions, when the atmosphere was very thick, I could not see the ordinary light, while the triform shone out quite distinctly. This, of course, shows the practical superiority of the "Triform Light" in thick weather, but what struck me most forcibly was the effect upon the fog of the flashing light.

It appeared, if I may so describe it, to pulsate and illuminate the fog with a luminous halo. On one occasion I could not have discerned the light at all had it not been for its effect in suddenly illuminating the atmosphere.

I may say, in conclusion, that I have frequently observed the same phenomenon with our other flashing gas lights, especially that at Rockabill, and have called upon others who were with me at the time to corroborate my observation, viz., that while the light itself was not discernible, its "luminous halo" clearly indicated its position. This I regard as a most important peculiarity of the gas light, and, in fact, its greatest advantage.

A. Kuss Gahney.

Enclosure 4, in No. 19.

COPELAND ISLAND LIGHTHOUSE.

ESTIMATED COST of Altering present Light to a First Order Fixed Dioptric Light; Cost of Works for burning Gas in a 28-jet Burner, in Triform, with a powerful Siren driven by a Gas Engine; and for burning Mineral Oil in a Six-wick Burner, with a powerful Siren driven by a Caloric Engine.

	£.	s.	d.	Gas (28-jet Burner in Triform, with Siren driven by Gas Engine).	Mixed Oil (Six-wick Burner, with Siren driven by Caloric Engine).
				£. s. d.	£. s. d.
Cost of Works - - - - -	£.	10,588	18	-	6,010 18 8
Annual maintenance - - - - -		518	15	9½	548 3 8
Ordinary repairs - - - - -		187	18	2	138 0 4
Special repairs - - - - -		120	0	0	101 0 2
TOTALS - - - - -	£.	810	5	9½	688 1 -

(signed) W. Douglass.

Enclosure 5, in No. 19.

Irish Lights Office, Dublin,
9 April 1860.

Sir,

I HAVE the honour to submit, for the information of the Deputation Committee, a statement, showing the estimated cost of a 28-jet triform light with fog signal driven by a gas engine, for Copeland Island, based on the average amount of extra gas consumed during fog at three stations. This extra amount is very much below the amount usually estimated, my calculation being for the single burner, using the 28 jet in clear weather, the 68 jet for 360 hours, and the 108 jet for 360 hours, 158,400 cubic feet, whereas the average amount for Hook Tower, Minehead, and St. John's Point is only 22,697 feet. Therefore, as the costs for the single burner system was an average of the quantity used at five stations, I have added the latter amount only to that consumed by a single 28-jet burner for 3,692 hours of clear weather. Thus,—

3,692 hours clear, at 50 cubic feet per hour	-	-	-	184,600
Amount actually consumed during fog at three stations	-	-	-	22,697
TOTAL quantity	-	-	-	207,297
TOTAL for Triform system	-	-	-	374,600
INCREASE for Triform	-	-	-	67,303

If the full estimated quantity for fog was burnt at the different stations there would be a decrease in favour of the triform system of 68,400 cubic feet.

W. Loez, Esq.

I remain, &c.
(signed) W. Douglass.

Enclosure 6, in No. 19.

COPELAND ISLAND LIGHTHOUSE.

(A.)—STATEMENT showing in Detail Estimate of Annual Cost using a Triform Gas Light and Gas Signal driven by a Gas Engine, for using 28-jet Burner in Clear Weather.

Wages:	£.	s.	d.	£.	s.	d.
Principal Keeper - - - - -	78	10	-			
Assistant Keeper - - - - -	60	-	-			
Uniforms for Keeper - - - - -	5	14	-			
Gas maker - - - - -	45	10	-			
				179	-	-
House Coals:	£.	s.	d.			
Coals for ditto, 5 tons - - - - -	7	14	-			
Coals for Light Keepers, 25 tons - - - - -	25	13	4			
				33	7	4
Stores:	£.	s.	d.			
Cleaning skins, 5 s. 9 d.; sponge 3 s. - - - - -	-	8	0			
Glass powder, 6 d.; spirits of wine, 4 s. 10½ d. - - - - -	-	5	4½			
Cotton waste, 1 l. 6 s.; sundries, 1 l. 1 s. - - - - -	2	7	1			
				3	1	5½
Gas Coals:	£.	s.	d.			
21 tons 18 cwt. 2 qrs. furnace coal, 28 s. 10 d. - - - - -	58	-	7			
27 tons, 9 cwt. 2 qrs. Carmel coal, 42 s. 10 d. - - - - -	58	15	4			
Lime, 5 l. 16 s. 5 d.; oxide of iron, 3 l. 15 s. - - - - -	9	11	5			
Reborts and Setting:	£.	s.	d.			
Reborts and setting - - - - -	81	17	11			
Burners, safe chimneys, mercury, &c. - - - - -	10	-	-			
Tools and coke barrows - - - - -	5	-	-			
				100	6	3
TRIFORM LIGHT AND GAS ENGINE.						
Increased quantity of gas for triform light per annum over the amount used, actually, at present, with single burner, during Aug. 57 202; supply for gas engine, 155 485 = 226 702 cubic feet: - - - - -						
Extra Cost for Increased Consumption of Gas:	£.	s.	d.			
Extra coal required, Camell 22 tons 2 cwt. 2 qrs., at 42 s. 10 d. - - - - -	47	7	8			
Extra coal for furnace, 17 tons 12 cwt. 3 qrs., at 22 s. 10 d. - - - - -	30	2	8½			
Extra lime and oxide of iron - - - - -	7	14	2			
Extra carriage on total quantity of gas coal for delivery on Copeland Island, 80 tons 3 cwt., at 4 s. 9 d. - - - - -	25	1	2			
				95	5	0½
Signalman - - - - -	45	10	-			
Costs for signalman - - - - -	7	14	-			
				54	10	-
Boat-hire - - - - -	-	-	-	93	8	-
TOTAL - - - - -	£.			518	18	3½

9 April 1880.

(signed). W. Douglas.

Enclosure 7, in No. 19.

STATEMENT showing in Detail Estimate of Annual Cost of a Six-Wick Burner and a Fog Signal worked by Calceis Engines, for Copeland Island Lighthouse.

MAINTENANCE OF LIGHT.		£. s. d.	£. s. d.
Wages:			
Principal Keeper	- - - - -	70 10 -	
Assistant ditto	- - - - -	65 - -	
Uniform for ditto	- - - - -	5 14 -	
Coal:			
20 tons of house coal, at 23 s. 8 d.	- - - - -	25 12 4	107 17 4
Oil:			
1,216 gallons of oil, at 1 s.	- - - - -	65 16 -	
Wicks	- - - - -	4 9 9	
Cylinders	- - - - -	5 10 2	
Cotton waste	- - - - -	- 15 6	
Sundries	- - - - -	2 2 0	78 15 2
MAINTENANCE OF FOG SIGNAL.			
Wages:			
Wages to Keeper	- - - - -	48 10 -	
Coals	- - - - -	7 14 -	54 10 -
Material:			
Coke for engines, 12 tons, at 51 s.	- - - - -	18 12 -	
Stoves	- - - - -	16 - -	
Firewood for lighting engines	- - - - -	5 - -	38 12 -
Boat attendance	- - - - -	- - -	25 8 -
TOTAL		- - £.	248 9 0

1 April 1880.

(signed) W. Douglas.

Enclosure 8, in No. 19.

COPELAND ISLAND LIGHTHOUSE.

ESTIMATED COST of Altering the Light to a Dioptric Light burning Gas, and providing a First Class Fog Siren driven by a Gas Engine.

LANTERN.	£.	s.	d.	£.	s.	d.
First Order Lantern - - - - -	1,333	-	-			
Taking down Old Lantern, fixing New Lantern, and Carriage of Material - - - - -	325	-	-			
Alteration to Gallery of Tower - - - - -	100	-	-			
Gas House - - - - -	850	-	-			
Gasmaker's House - - - - -	000	-	-			
Superintendence - - - - -	125	-	-			
House for Fog Siren and Engine - - - - -	650	-	-			
House for Fog Signal Attendant - - - - -	600	-	-	4,443	-	-
DIOPTRIC APPARATUS.						
Dioptric Apparatus for a Trifurca Gas Light - - - - -	1,705	-	-			
Light for New Island - - - - -	55	-	-			
Carriage and fixing - - - - -	90	-	-			
Temporary Lights - - - - -	350	-	-			
Extra Lamps, Pipes and Valves, &c., for Trifurca Apparatus - - - - -	140	-	-	2,340	-	-
GAS APPARATUS.						
Gas Apparatus, Retorts, Breeches, and Pipes complete - - - - -	850	-	-			
Water House, Meters, Gas-pipes to Dwellings, and Fittings - - - - -	150	-	-			
Carriage of Material - - - - -	75	-	-			
Superintendence - - - - -	125	-	-	1,200	-	-
FOR SIREN.						
Fog Siren - - - - -	400	-	-			
Receivers - - - - -	215	-	-			
Two Engines, Carriage, and Erection - - - - -	002	-	-			
Superintendence - - - - -	75	-	-			
Carriage - - - - -	50	-	-			
Extra Cooling Tanks - - - - -	14	-	-	1,416	-	-
Contingencies, 10 per cent. - - - - -						
				9,500	-	-
				300	18	-
TOTAL - - - - -	£.			10,338	18	-

Enclosure 9, in No. 19.

Sir, 33 to 36, Capel-street, Dublin, 11 March 1880.

ACCORDING to the directions of the Committee, with whom I had the honour of an interview on Friday, I now enclose amended tender for the works required for Copeland Island. You will perceive that in consequence of what was stated to me by the Committee as to the temporary light required to be erected, and also that two red beams of light were required, one to be thrown on Mew Island, the other to mark the danger of the "Briggs," the original estimate of 8,630 £ is increased by 475 £.

The Secretary to the
Commissioners of Irish Lights.

I am, &c.
(signed) John R. Wigham.

TENDER above referred to.

33 to 36, Capel-street, Dublin, 11 March 1880.

WE undertake to execute the following works at Copeland Island Lighthouse for the Commissioners of Irish Lights for the sum of 8,630 £ sterling, in accordance with our Mr. Wigham's letter of the 18th September 1879, viz.:—

To supply and erect gas making apparatus, including cast-iron tank, according to the enclosed specification and drawings numbered 1, 2, 3, 4, and 5.

To erect reboiler house, coal store, and purifier shed, according to above-mentioned plans and enclosed specification.

If we be allowed to utilise the existing building referred to in Mr. Wigham's letter of 16th October last, which we think quite suitable for the purpose, the above price will be reduced by 500 £.

To erect gas-makers' dwelling, according to drawing No. 6 herewith.

To supply and lay down main pipes, with syphon boxes, &c., for conveying gas to lighthouse, also to supply and fix station meter and consumption meters with, by passes &c., for lighthouse dwellings and siren house.

To supply and erect patent gas sounded siren in duplicate, with house over same, as at Howth Bulley Lighthouse.

To alter present gallery to suit new triform lantern.

To remove present lantern of lighthouse, and to supply and fix new triform lantern glazed complete, with special ventilation for same, according to specification herewith.

To supply and erect dioptric triform apparatus, with gun-metal astragals, cast-iron table, and structure with hinged panel to give access to interior.

To supply and fix triform apparatus for gas, with three gas burners complete, from 28 to 108 jets in each burner, and to connect same to pipes from gas boiler.

To supply and fit up gas fittings for three dwellings, gas-house, siren-house, and basement of tower, including brackets, pendants, &c.

In order that there may be no extra charges whatever, every expense of every kind, including patent rights, is embraced in this tender; also all travelling expenses and carriage, except of the ironwork and dioptric apparatus, which are to be conveyed by the Commissioners' steamer when delivering other stores.

(signed) J. Edmundson & Co.

P.S.—Having been since informed that the Commissioners, upon reconsideration of the newly-proposed arrangement for lighting the station, are of opinion that there should be a lens with burner complete and red shade for throwing red light upon Mew Island in such a manner as not to interfere with the main light of the lighthouse seaward of the island, and also a red sector to cover the "Briggs" and that a temporary light should be provided and fixed, of the same size and character as existing light, for use until the new dioptric apparatus is ready to be lighted, we undertake to supply and erect the above specified additional work, including first order annular lens and red shade, with special gas burner for beam for Mew Island, for the sum of four hundred and seventy-five pounds sterling.

(signed) J. Edmundson & Co.

Enclosure 10, in No. 19.

Sir,

Irish Lights Office, Dublin, 11 March 1880.

I beg to inform you, for the information of the deputation committee, that I have examined the drawings submitted by Messrs. Edmondson & Co., consisting of plans, elevations, and sections of retort house, coal store, and purifying house, with retort bench, gas holder, and gas makers' house, accompanied with specifications for the work shown on the drawings excepting the gas makers' house, for which there is no specification; and a short description of a triform lantern.

The specification for the gas apparatus is full and complete, and although not exactly in accordance with my own views, is such as might be placed in the hands of a contractor to carry out; that for the retort house and coal shed is vague and incomplete, the scantling of the timber for the roof of the retort house is not described of sufficient strength for such an exposed situation as Copeland Island, the quality of the material to be used in the building is barely mentioned, and the general instructions are not sufficient to ensure the completion of the work in accordance with the original intention of the engineer.

The specification for the triform lantern is still more imperfect, and as it is not accompanied by a drawing, conveys an indistinct idea of the structure proposed for erection. A lantern of special make is not required for the triform light, and one of my reasons for recommending it was that the usual lantern for oil light could be used either for it or for the electric light.

There is no specification accompanying the drawing for the gas makers' house, for which I included in my estimate the sum of 680 £.

There is neither drawing nor specification for the optical apparatus, the fog signal, the signal house, nor the signal keeper's house, although these works are set down in my estimate of 19th September 1879 for the sum of 5,270 £ 8 s.

I remain, &c.

(signed) W. Douglass.

W. Lees, Esq.

Enclosure 11, in No. 19.

Sir,

33 to 36, Capel-street, Dublin, 17 March 1880.

REFERRING to the subject of Copeland Island Lighthouse, I beg to say that I have read the letter of Mr. Douglass to you of the 11th instant which you handed me, and also his specifications numbered 1 to 10, purporting to be for the entire work to be done at Copeland Island Lighthouse.

The specifications as given to me are divided into three groups, A, B, C.

(A.) Specifications numbered 1 and 2 referring to lantern and optical apparatus, which are equally required whether gas or oil be used, of course with modifications to suit whichever illuminant is fixed upon.

(B.) Specifications numbered 3, 4, 5, 6, and 7, for gas makers' dwelling, buildings for gasworks, gas apparatus, fog-signal house, and gas fog-siren. All these are only applicable where gas is to be used.

(C.) Specifications numbered 8, 9, and 10, for dwelling for caloric engine signal-keeper, house for caloric engine fog-signal, and caloric engine fog-signal. These three items are only required in the case of oil being used as the illuminant. With respect to the last group (C.), Nos. 8, 9, and 10, I may remark that no dwelling for signal-keeper is required in the case of gas, as no signal-keeper is required, the gas engines, as at Howth Bailey, are worked by the light-keepers; and unlike caloric engines, which take about three-quarters of an hour to get up sufficient heat to put them into action, during which time vessels might run into danger, these gas engines only require the application of a lighted match to start them into full work; the light-keepers can do this the more readily that, unlike oil, the gas, once lighted in the lantern, requires no attention from them, its light never varying in any degree. At Howth Bailey the gas-maker has during fogs rather hard work to keep the gas-holders supplied with gas, because the storage for gas at that station is very limited, not having been originally designed to supply a fog-signal as well as the fog power of the burner in the lantern, but in the case of Copeland, as I will again mention further on, the storage for gas will be so ample that the gas-maker will have no difficulty in supplying gas both for the lantern and the fog-signals. The cost of this signal-keeper's dwelling not forming any part of the first outlay for gas should therefore not be added to the gas estimate, but it necessarily forms part of the first outlay for oil. Mr. Douglass estimates it at 650 £, and the interest on this sum should be charged against the cost of the maintenance of the oil system, as should also the wages of the signal-keeper; and as the wages of this keeper will probably be higher than the wages of the gas-maker, one of the heaviest items of the cost of gas will at once

once be more than balanced. I observe respecting the fog-signal house for the calorific engine that Mr. Douglass proposes to adapt an existing building for that purpose. To make a fair comparison between the cost of the oil establishment and that of the gas establishment, this building should be calculated as altogether new; in the gas estimates both mine and Mr. Douglass's a new building for the gas fog-siren is included. This old building is probably the same that I propose, if permitted, to use as a gas-house. I deduct 500*l.* for so doing, and it seems to me that this 500*l.* should be added to the cost of the oil establishment estimated by Mr. Douglass.

I farther remark with respect to this group of specifications (C.) that in specifying the calorific engines for the fog signals, Mr. Douglass excludes from his calculation the large cylindric air reservoir which is necessary to work the sirens. In my tender I have included this reservoir, as well as every other item, and I think it is quite clear that the value of this reservoir should be added to the cost of Mr. Douglass's oil calculation. With respect to the second group (B.), Nos. 3, 4, 5, 6, and 7, I am glad to learn from Mr. Douglass's letter that he considers my specification for the gas apparatus full and complete, but with respect to the buildings for gasworks he considers it vague and incomplete. My specification is practically the same as that for similar work done at Hlabro, but I am quite willing to be bound by his specification in every respect, and I make the same remark with regard to the gasmaker's dwelling, so that as to these three large items there is no difference of opinion between Mr. Douglass and myself.

It is only right, however, that I should point out that in my specification for gas apparatus, I propose to supply one resort, with all its fittings and connections, more than Mr. Douglass; and I also propose to supply a very much larger cast-iron tank and gas-holder, the contents of Mr. Douglass's tank being only 5,310 cubic feet, while mine contains 9,630.

I observe also that Mr. Douglass specifies that certain articles of ironmongery are to be supplied by the Commissioners; all articles of ironmongery, as well as all other items, are included in my tender. I only mention these items because it is absolutely necessary that they should be supplied, and I think their cost should be added to Mr. Douglass's estimate, if it is to be brought into comparison with mine. With respect to my patent gas fog signal, and the house to contain it, you will perceive from my tender that it is not necessary that I should remark on Mr. Douglass's specification, because no specification is required, I having tendered to supply this apparatus and house in all respects similar to those which have been erected at Howth Bailey, of which I understand the Commissioners and Mr. Douglass have fully approved, including the duplicate apparatus which I have now in hand. This is a matter which, being a speciality of my own, I have studied very carefully; and I believe the strong galvanised iron structure by which the apparatus is proposed to be surrounded, and with which in some parts it will be connected, is safer and better for the gas engines, &c., than the ordinary masonry house with wooden roof specified by Mr. Douglass.

With respect to the first group (A.), Nos. 1 and 2, Mr. Douglass's specification for the lantern is not, I find, intended for a trifern gas light, but is the usual specification for a lantern where a single oil lamp is used as the illuminant.

I am quite willing to make the lantern for Copeland of the height and diameter given by Mr. Douglass in his specification; but there are some details as to the cylindric form of the glass ventilation, &c., which would be wholly unsuited to my trifern gas light, and therefore a specially designed lantern is necessary. I did not enclose a drawing with my tender, because the lantern being the first ever made for a trifern fixed light apparatus, it would be difficult to show all the details of construction, which could only be accurately ascertained according as the work proceeded; but I would submit all such details to Mr. Douglass for his approval before they were carried out. I observe that Mr. Douglass specifies that the Commissioners are to supply the glass for the lantern. My tender includes all glass, but not having Mr. Douglass's schedule of total cost, I cannot say whether he has included this item in his estimate; but if not, it is evident it ought to be added.*

As to the optical apparatus, Mr. Douglass's specification is for an ordinary first order dioptric apparatus, with top and bottom prisms for one light, and not for a trifern light as proposed to be erected. There is no reference whatever to gas burners, flames, or trifern light. For similar reasons to those above stated as applying to the lantern, I could not well give my drawing of this apparatus, which will be the first of its kind ever made; but, as above stated, I would be prepared to submit all necessary drawings to Mr. Douglass for his approval, from time to time, as the work proceeds. I think it would be only right, with regard to these two items, that if it has not already been done, the additional cost involved in the supply of a trifern apparatus, instead of the ordinary plan of one light, should be added to Mr. Douglass's estimated cost. I observe with regard to this optical apparatus, that Mr. Douglass's specification seems to imply that it need not

* I do not find any reference in any of Mr. Douglass's specifications to gas burners, trifern or otherwise, nor to internal gas fittings, gas tubing, &c., for three dwellings and light-house towers, nor for the brass brackets, pedestals, &c., for these dwellings and tower, but all these may be included in his schedule of total cost.

be constructed to illuminate the whole horizon; my estimate provided that it should do so, and if it be intended that the whole horizon should not be illuminated, my tender would be reduced proportionately to the size of the arc not to be illuminated.

It will be seen from the foregoing that there need be no fear of disagreement between Mr. Douglas and myself. He has approved of my gas apparatus specification, and I have agreed to his specification for building work, and have undertaken for the bulk sum of my tender to carry on the entire work, subject to his supervision; submitting the various details connected with my patents for his approval, and completing the whole to his entire satisfaction.

William Lees, Esq.,
Secretary to the Commissioners of Irish Lights.

I am, &c.
(signed) John R. Wigham.

Enclosure 12, in No. 19.

Sir,
I am favoured with yours of the 13th instant, in which you ask to be informed what would be the extra cost over that charged for a single fixed light for providing and fixing at Copeland Island complete, a 48-jet burner in biform and also in triform, the price to include burners, condensers, valves, &c., but not to include alteration to optical apparatus.

In reply I beg to say that my patent for biform and triform lights includes the dioptric apparatus as well as the burners, &c., so as to secure the perfect carrying out of the system, both as to economy and efficiency, and prevent injury to it from the intervention of persons who may not fully understand the details which vary for each lighthouse. For this reason it would be difficult for me to give separate prices for the burners, &c., as requested, but I am able to give your board full particulars of the cost of the entire work (having visited Copeland Island with the late Captain Hawes for the purpose of estimating for lighting the lighthouse with gas), and in so doing I shall also carry out the very pointed recommendation which I find in a recent Parliamentary Paper, issued by the Parliamentary Secretary of the Board of Trade, which has just reached me from London, containing a report to your Board by Professor Tyndall of his inspection of Galley Head Lighthouse. After giving a favourable report as to Galley Head, and quoting the opinion of eminent scientific and practical men confirming his view, and that which your Board has so long and consistently maintained in regard to the gas system, he says, "I only know indeed of one circumstance which could legitimately interfere with the extension to other important points on the Irish Coast of the system of gas illumination, and that is, inordinate cost of production. Regarding this point ample data must be in existence, and the Board of Trade, which has hitherto shown a marked liberality towards Mr. Wigham, has here, I think, a right to demand the fullest and most distinct information."

Dr. Tyndall evidently refers here to first cost of plant, &c., and in order to carry out this requirement that I should give your Board the fullest and most distinct information, and to provide against any unnecessary expenditure in any portion of the work, and to ensure that there shall be no extras whatever, I hereby guarantee that if the work is left in my hands, the entire cost of converting Copeland Island Lighthouse into a triform gas station, including new lantern, gas apparatus buildings, gas siren, &c., and every expense, shall not exceed 8,930 £, and if the work be thus entrusted to me I will make no charge whatever for my patent rights which are connected, not only with the biform and triform apparatus, but also with the gas siren, &c., and will undertake to complete everything in the best manner, with all the newest improvements, and to the entire satisfaction of the Board's engineer.

I am, &c.
(signed) John R. Wigham.

P.S.—I enclose Memorandum of Particulars.

William Lees, Esq.,
Secretary to the Commissioners of Irish Lights.

MEMORANDUM of Particulars for converting Copeland Island Lighthouse into a first order Triform Gas Station.

33 to 36, Capel-street, Dublin, 18 September 1878.

To remove the present lantern and catoptric apparatus, and replace same by a large new lantern, suited to Mr. Wigham's Patent Triform Gas Burners, glazed complete, and fitted with dioptric fixed apparatus, with patent burners and sires, making the necessary alterations to the present lantern of lighthouse, and fixing temporary light, equal to the present light, until the new light is ready for exhibition.

To

To supply and erect a gas-sounded fog siren, including gas engine, &c., same as at Howth Bailey.

To provide and fix dioptric apparatus and burner for throwing coloured beam on New Island.

To supply and erect gas works with all necessary buildings, retorts, purified condenser, gas holder, &c., adequate for the supply of the above burners and siren, and connected with lighthouse by main pipes, &c.

All carriage and travelling expenses are included, but the iron work, dioptric apparatus, &c., to be conveyed by the Board's steamers when delivering other stores.

The whole to be completed and left in perfect working order, subject to the inspection and approval of the engineer to the Commissioners.

(signed) John R. Wigham.

William Lees, Esq.,
Secretary, Commissioners of Irish Lights.

Enclosure 13, in No. 19.

Sir,

33 to 36, Capel-street, Dublin, 16 October 1879.

In my letter of 18th ultimo, in which I give an estimate for the total expense of converting Copeland Island Lighthouse into a trifern gas station, I mentioned that my estimate included all necessary buildings; these buildings are, gas house, coal store, and gas makers' dwellings, but it occurs to me to mention that there is an existing building, which with some alteration would make an excellent gas house; and if I were allowed to utilise that building as far as it is available, my estimate would be reduced by 500 l. Perhaps you will permit me respectfully to remind your Board that my estimate also includes the gas siren with house over same, complete same as at Howth Bailey, and that the advantage of that kind of siren (which of course can only be used where there is gas) is that it can be sounded at a few moments' notice, unlike all other sirens which require a considerable time to get up heat during which time vessels may run into danger.

I am, &c.

(signed) John R. Wigham.

William Lees, Esq.

— No. 20. —

Board of Trade to Commissioners of Irish Lights.

(H. 2526.)

Board of Trade (Harbour Department),

Whitehall Gardens, S.W., 18 May 1880.

Sir,

I am directed by the Board of Trade to acknowledge the receipt of your letter of the 10th ultimo, further on the subject of the proposed improvement in the lighting of Copeland Island, Belfast Lough, and more especially on the comparative cost of gas and oil employed as illuminants.

The Board have carefully considered the observations of the Commissioners of Irish Lights on this subject, the further communication of Mr. Wigham the relative estimates and tenders, and the remarks of Mr. W. Douglass thereupon.

I am now to state that under all the circumstances, and having regard to the representations of the Commissioners, the Board of Trade sanction the establishment of a gaslight and siren fog signal at Copeland Island, and are prepared to approve of the necessary outlay, estimated by Mr. Douglass to amount to 10,338 l. 18 s., for carrying out the alterations in the present light, and construction of the requisite gas works.

The Board, however, on a careful consideration of the entire subject, think it undesirable that the tender for the whole work should be entrusted to any one firm without competition.

I am therefore to acquaint you, for the information and consideration of the Commissioners, that the Board of Trade are of opinion that separate tenders should be invited in the regular course for the lantern as well as for the dioptric apparatus and buildings, and that the whole alteration should be carried out under the supervision, and on the responsibility of Mr. W. Douglass.

The papers which accompanied your letter are herewith returned, together with six plans.

I am, &c.

(signed) T. H. Farrer.

The Secretary to the
Commissioners of Irish Lights.

COPELAND ISLAND LIGHT.

COPY of CORRESPONDENCE between the Commissioners of Irish Lights, the Trinity House, and the Board of Trade, respecting the Improvement of the LIGHTS, and the Establishment of a Fog SIGNAL at, *Copeland Island*, and the Adoption of GAS instead of OIL as a means of Illuminating that Station.

(*Mr. Stuart.*)

Ordered, by The House of Commons, to be Printed,
10 August 1886.

343—Sess. 2.

Under 4 s.